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- 1646 Shovel-Ready Science?  
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- 1654 Madagascar's Coup Endangers Science and Scientists
- 1655 Arctic Summer Sea Ice Could Vanish Soon But Not Suddenly
- 1656 OSTP, NOAA Chiefs Finally Get a Chance to Lead
- 1656 Koonin Tapped at DOE, Which Lays Out New Spending
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- 1658 Twins May Think Alike Too, MRI Brain Study Suggests  
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*R. S. Seymour*  
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*P. M. Sander et al.*
- Specimens Versus Sequences  
*G. Zhang*  
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*B. J. Strasser*

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- 1673 *Endless Forms: Charles Darwin, Natural Science and the Visual Arts*  
*D. Donald and J. Munro, Curators and Eds.,*  
*reviewed by H. Ritvo*
- 1674 *Emerging Model Organisms*  
*Cold Spring Harbor Laboratory Press,*  
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- 1675 *Browsings*

## EDUCATION FORUM

- 1676 Professional Science Master's Programs Merit Wider Support  
*R. R. Colwell*  
>> *Science Podcast*

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*F. Carlsson and E. J. Brown*  
>> *Report p. 1729*
- 1679 Through a Mirror, Differently  
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- 1680 Producing Transportation Fuels with Less Work  
*D. Hildebrandt et al.*
- 1682 Pressurized Viruses  
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- 1683 Dangers In and Out  
*M. E. Bianchi and A. A. Manfredi*  
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## BREVIA

- 1687 Queen Succession Through Asexual Reproduction in Termites  
*K. Matsuura et al.*  
Queen termites produce their successors asexually but use normal sexual reproduction to produce other colony members.

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## COVER

False-color, aberration-corrected transmission electron microscope image of a suspended single atomic layer of graphene. When an electron beam induces ejection of an atom from the edge of an intentionally made ~3-nm hole (black), the hole enlarges; the remaining edge carbon atoms rearrange from perfect hexagons into predicted metastable configurations. See page 1705.

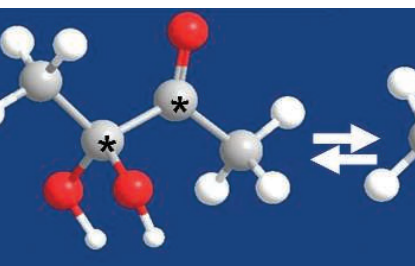
*Image: Zettl Research Group and National Center for Electron Microscopy, Lawrence Berkeley National Laboratory; 3D visualization via WSxM software*

## DEPARTMENTS

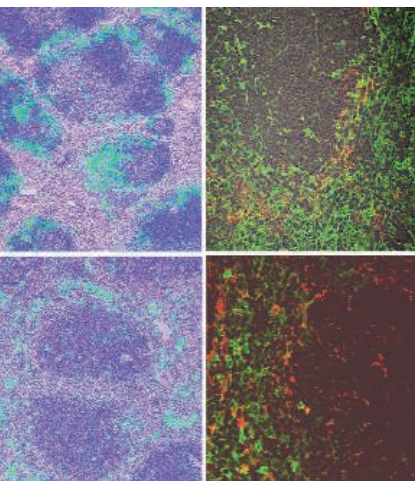
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## RESEARCH ARTICLES

- 1688** Fermi Observations of High-Energy Gamma-Ray Emission from GRB 080916C  
*The Fermi LAT and Fermi GBM Collaborations*  
This highly luminous gamma-ray burst had the largest apparent energy release yet measured.

- 1693** Comprehensive Characterization of Genes Required for Protein Folding in the Endoplasmic Reticulum  
*M. C. Jonikas et al.*  
A nine-protein transmembrane is among several hundred genes found to be critical for protein folding in the endoplasmic reticulum.

## REPORTS

- 1698** Lubrication at Physiological Pressures by Polyzwitterionic Brushes  
*M. Chen et al.*  
Extremely low friction coefficients under high applied pressures are reported for polymeric brushes grafted to a surface.

- 1701** Controlled Formation of Sharp Zigzag and Armchair Edges in Graphitic Nanoribbons  
*X. Jia et al.*  
Joule heating is used to modify the defect structure along the edges of a graphene ribbon.

- 1705** Graphene at the Edge: Stability and Dynamics  
*Ç. Ö. Girit et al.*  
Atom rearrangement at the edges of a hole in a sheet of graphene is observed using transmission electron microscopy.

- 1708** Reversible Interactions with para-Hydrogen Enhance NMR Sensitivity by Polarization Transfer  
*R. W. Adams et al.*  
The nuclear spin polarization of para-hydrogen can be transferred to organic molecules when both bind to a metal complex.

- 1711** Increasing Hyperpolarized Spin Lifetimes Through True Singlet Eigenstates  
*W. S. Warren et al.*  
Singlet states between strongly coupled spins can be used to enhance the magnetic resonance imaging of organic molecules.

- 1714** Greatly Expanded Tropical Warm Pool and Weakened Hadley Circulation in the Early Pliocene  
*C. M. Brierley et al.*  
The warm tropics of the Early Pliocene, about 4 million years ago, extended much farther toward the poles than they do today.

- 1718** Structure of P-Glycoprotein Reveals a Molecular Basis for Poly-Specific Drug Binding  
*S. G. Aller et al.*  
A membrane protein that removes toxins and drugs from cells is caught binding two drug molecules in a large internal cavity.  
>> *Perspective p. 1679*

- 1722** CD24 and Siglec-10 Selectively Repress Tissue Damage-Induced Immune Responses  
*G.-Y. Chen et al.*

A signaling pathway involving an immune protein protects cells against the potentially fatal immune response induced by tissue damage.

>> *Perspective p. 1683*

- 1726** Visualizing Antigen-Specific and Infected Cells in Situ Predicts Outcomes in Early Viral Infection  
*Q. Li et al.*

Mapping the rate and magnitude of early events in viral infections predicts the success or failure of immune control.

- 1729** Infection by Tubercular Mycobacteria Is Spread by Nonlytic Ejection from Their Amoeba Hosts  
*M. Hagedorn et al.*

Tubercular bacteria can slip undetected from host cell to host cell via specialized exit structures called ejectosomes.

>> *Perspective p. 1678*

- 1734** Critical Population Density Triggers Rapid Formation of Vast Oceanic Fish Shoals  
*N. C. Makris et al.*

A shift from disordered to highly synchronized behavior is seen in hundreds of millions of Atlantic herring at a critical population density.

- 1737** Genetic Contribution to Variation in Cognitive Function: An fMRI Study in Twins  
*J. W. Koten Jr. et al.*

Analysis of identical and fraternal twins shows genetic influence on brain activation during arithmetic and memory tasks.

>> *News story p. 1658; Science Podcast*

- 1740** Changes in Temperature Preferences and Energy Homeostasis in Dystroglycan Mutants  
*K. Takeuchi et al.*

Mutation of a membrane protein alters mitochondrial metabolism and temperature preference in flies.

- 1743** Quantitative 3D Video Microscopy of HIV Transfer Across T Cell Virological Synapses  
*W. Hübner et al.*

HIV uses the endocytic pathway to spread through virological synapses between immune cells.

>> *Science Podcast*

- 1747** A Transposon-Based Genetic Screen in Mice Identifies Genes Altered in Colorectal Cancer  
*T. K. Starr et al.*

A functional screen in mice uncovers genes that are likely to drive the growth of gut-specific tumors.



## SCIENCEONLINE

## SCIENCEEXPRESS

[www.scienceexpress.org](http://www.scienceexpress.org)

### Human Induced Pluripotent Stem Cells Free of Vector and Transgene Sequences

J. Yu et al.

Human induced pluripotent stem cells can be generated without integration of exogenous DNA into their genomes.

10.1126/science.1172482

### Sequential Regulation of DOCK2 Dynamics by Two Phospholipids During Neutrophil Chemotaxis

A. Nishikimi et al.

The signaling lipid phosphatidic acid links chemoattractant signals to directional movement of neutrophils.

10.1126/science.1170179

### A Frazzled/DCC-Dependent Transcriptional Switch Regulates Midline Axon Guidance

L. Yang et al.

A single receptor in *Drosophila* is involved in two molecular strategies that coordinate axon guidance.

10.1126/science.1171320

### The Role of Aerosols in the Evolution of Tropical North Atlantic Ocean Temperature Anomalies

A. T. Evan et al.

Changes in tropical North Atlantic sea surface temperatures are caused by variability in atmospheric aerosol abundances.

10.1126/science.1167404

### Asymmetric Autocatalysis Triggered by Carbon Isotope ( $^{13}\text{C}/^{12}\text{C}$ ) Chirality

T. Kawasaki et al.

The origin of chirality in asymmetric autocatalysis is due to carbon isotope substitution.

10.1126/science.1170322

## SCIENCENOW

[www.sciencenow.org](http://www.sciencenow.org)

Highlights From Our Daily News Coverage

### When Frying the Hard Drive Is a Good Thing

Laser-assisted magnetic recording could greatly increase storage capacity.

### Corn: It's Not for Cocktails

Scientists find earliest traces of maize—and discount a leading hypothesis about what it was used for.

### Feel-Good Music Feels Good Around the World

African tribal people can tell whether a Western song is happy or sad.

## SCIENTESIGNALING

[www.sciencesignaling.org](http://www.sciencesignaling.org)

The Signal Transduction Knowledge Environment

### RESEARCH ARTICLE: An Intramolecular Switch Regulates Phosphoindependent FHA Domain Interactions in *Mycobacterium tuberculosis*

T. J. Nott et al.

Binding of Rv1827 to target proteins through its forkhead-associated (FHA) domain does not require their prior phosphorylation at threonine residues.

### RESEARCH ARTICLE: Dynamic Signaling in the Hog1 MAPK Pathway Relies on High Basal Signal Transduction

J. Macia et al.

High intrinsic basal signaling in mitogen-activated protein kinase pathways ensures proper dynamic responses to environmental stimuli.

### PERSPECTIVE: Challenges and Opportunities in Defining the Essential Cancer Kinome

B. D. Manning

RNAi screens for essential kinases reveal that the potential therapeutic kinase universe is larger than expected.

### PERSPECTIVE: Amyloid Goes Global

I. Bezprozvanny

Amyloid plaques have farther-reaching effects on astrocytes than previously suspected.

### MEETING REPORT: Signal Transduction—Receptors, Mediators, and Genes

F. Entschladen et al.

Cell signaling researchers gathered in Weimar, Germany for the annual meeting of the Signal Transduction Society.

### PRESENTATION: Early Events of B Cell Activation by Antigen

D. Depoil et al.

B cells undergo membrane spreading and contraction during activation in response to antigen-presenting cells.

## PODCAST

S. J. Smerdon and A. M. VanHook

The activity of a bacterial FHA domain-containing protein is regulated intramolecularly.

## SCIENCECAREERS

[www.sciencecareers.org/career\\_magazine](http://www.sciencecareers.org/career_magazine)

Free Career Resources for Scientists

### Special Feature: Not What You Thought You'd Be Doing

E. Pain

A visual artist, a cartoonist, and a winemaker—all trained as scientists—are pursuing unexpected careers.

### The Itinerant Artist

E. Pain

Angelo Vermeulen eventually reconciled his talent for the arts with his scientific curiosity.

### In Vino Opportunitas

A. Levine

Jeff Mangahas left scientific work to become an award-winning winemaker at Hartford Vineyards.

>> [News story p. 1668](#)

## SCIENCEPODCAST

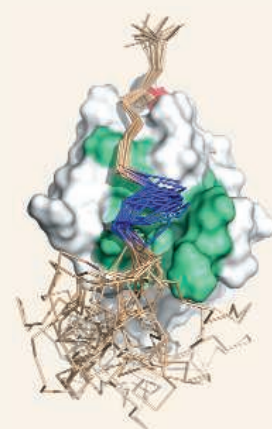
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SCIENCENOW  
Corn's rock-hard history.



SCIENTESIGNALING  
Rv1827 and its FHA domain.

## ORIGINSBLOG

[blogs.sciencemag.org/origins](http://blogs.sciencemag.org/origins)

A History of Beginnings

## SCIENCEINSIDER

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Science Policy News and Analysis

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